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Access to Technology and Student Academic Achievement: Empirical Evidence from Nepal

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Executive Summary

My research explores the linkage between access to technology and student academic achievement in Nepal. I measure access to technology using four proxies: availability of electricity, radio, TV and computer at home. I measure academic achievement using student test scores in the Grade 10 national level examinations.

I use an existing data from a large nationwide household survey conducted by Nepal's Ministry of Education with support from the World Bank. The cross-sectional data was collected at the individual student-level in the years 2004-2005. In addition to the main variables of interest, the sample also includes variables related to socioeconomic, demographic, parental and school characteristics.

I employ econometric tools, primarily simple ordinary least squares (OLS) regression model, logit probability model and matched OLS regression model using matching estimators, to examine the linkage between access to technology and student test scores among 18,847 Nepalese students.

My results indicate that students with access to electricity, radio, TV and computer at home, have higher average test scores overall. Particularly, access to a computer has the largest positive effect on a student's academic achievement. Simple OLS regression results suggest that those with access to a computer score 64 points higher than those without a computer at home. Matched OLS regression estimates show that the impact of access to computers is still positive when we match students within a given socioeconomic strata based on the likelihood of owning a computer. I also find that access to a computer has a larger positive impact on student populations who are less likely to own a computer.

In light of these findings, I recommend the government of Nepal to make technology more affordable for student use, increase public accessibility to computers by establishing local public computer stations, and provide general computer literacy and training programs in public schools and spaces. I also recommend the governmental of Nepal to promote educational radio programs since most households have easy access to radio. I additionally recommend the government of Nepal to begin a program focused on improved electricity, radio, TV and computer access by selecting a pilot project launch site where majority of the students attend public schools, belong to poor households and live far away from the district headquarters. The program can subsequently be launched at a larger scale by incorporating policy and implementation lessons at various stages.

I am especially grateful to Professor Kathryn McDermott for her invaluable feedback and detailed comments to improve this work. I am also grateful to Professor Michael Ash for his research methodology consulting and guidance on empirical strategy. I would also like to acknowledge Professor Charlie Schweik whose research interest in technology motivated me to examine technology as a variable of interest in education. I am also grateful to Estefania Marti Malvido and all participants at the "Topics in Education Policy" panel at the Association for Public Policy Analysis and Management 2018 DC Regional Student Conference at American University for useful discussions.

1 Introduction

It is well-documented that there exists a strong and positive relationship between school inputs and education outcomes (Das et al. 2013, 29). Past academic literature on education has focused on the linkage between schooling inputs and cognitive outcomes among school-age children (Hanushek 2006, 865; Rivkin et al. 2005, 417). Although prior literature has highlighted the significance of technology as an important educational input (Berlinski and Buso 2015, 173; Cristia et al. 2017, 1), there exists a dearth of empirical evidence on the impact of access to technology on student academic achievement in a developing country context. This paper employs econometrics tools to take advantage of a nationwide household survey conducted in Nepal to explore the role of technology in improving learning outcomes. My research question specifically explores the linkage between access to technology and student academic achievement in Nepal. I use four different proxies to measure access to technology (availability of electricity, radio, television, and computer). The primary variable of interest is access to technology and the main outcome variable is student test scores in Grade 10 national level examinations.

The rest of this paper is organized as follows: Section 2 provides background information on Nepal's education sector. Section 3 identifies the data source and provides an overview of research methods. Section 4 summarizes the descriptive statistics of independent, dependent and control variables. Section 5 states and interprets results from quantitative analyses. Section 6 draws conclusions based on the results and explores its strengths and limitations. Finally, Section 7 highlights the policy recommendations of this research.

2 Background

Nepal is a land-locked country with a total area of 147,181 square km surrounded by India on three sides and China to the north. According to 2011 Population Census, the population of Nepal stands at 26.6 million. Topographically, Nepal is divided into three distinct ecological zones: mountain, hill, and Terai (or plains). Twenty-three percent is occupied by the Plains in the southern belt, 42 percent by the Hills in the middle belt and the remaining 35 percent by Mountains in the northern belt. According to Food and Agriculture Organization (FAO), these regions have distinct geological, soil, climatic and hydrological characteristics. For administrative purposes, Nepal is divided into 14 zones and 75 administrative districts. Districts are further divided into smaller units, called village development committees (VDCs) and municipalities. In September 2015, Constituent Assembly divided Nepal into seven federal states, which are further sub-divided into urban and rural areas.

According to 2011 Population Census, there are 125 ethnic groups in Nepal, including Chhetris (16.6%) and Brahmins (12.2%) that constitute high caste groups in the study. In addition, Magars, Tharus, Tamangs, Newars, Kamis, Muslims, Yadavs and Rais are other ethnical groups in the study. Nepali is widely spoken and is the first language of 44.6% of the entire population (Paudel and de Araujo 2017, 327). Maithili and Tharu are also in wide use, though some 120 other languages are also native to Nepal. In addition, 81% of the people in Nepal practice Hinduism. Agriculture remains Nepal's principal economic activity, employing around 66 percent of the population (Paudel and de Araujo, 2017, 328).

Nepal's education system comprises primary school (grades 1 -5), lower secondary school (grades 6-8), secondary school (grades 9-10) and higher secondary school (grades 11-12). About 50% of children complete primary school, and only two thirds of them graduate from secondary

school (Jayachandran 2014, 194). This study focuses on test scores of a national School Leaving Certificate (SLC) exam, which is the "analog of a high school diploma in the United States, both a terminal credential with value in the labor market" and a major milestone to continue higher education (Jayachandran 2014, 194).

The SLC exam is conducted across the country over a ten-day period during the month of March, and tests students in eight subjects. These subjects include math, science, English, Nepali, social studies, HPE (health, population and environment) and two optional subjects such as accounting, agriculture and home science. To pass the overall exam, a student must score at least 32 out of 100 on every subject. The scores are added together across subjects, and the student's total score must be at least 256 out of 800 to pass the SLC exam. 175,000 students took the SLC exam in 2004 but only 46% of the students passed (Jayachandran 2014, 194).

Approximately 73% of the students that appeared in the SLC examination attended public schools in 2004 (Mathema and Bista 2005, 50). There exists significant disparity in average test scores across school type, gender and ethnicity. It is well-documented that public schools in Nepal often lag behind the private schools in terms of overall pass percentage and total average scores. Pass rate of public schools was as low as 38% compared to an average pass rate of 85% for the private schools (Mathema and Bista 2005, 51). Furthermore, both the pass rate and the average scores were lower than those of private schools in all subjects, with significant gaps in Mathematics, Science, and English. Specifically, the average total score in SLC is around 39 percent higher (or 17 points higher) for private schools compared to public schools (Mathema and Bista 2005, 51).

In terms of gender, only 41% of the regular female SLC candidates passed the examinations in 2004 compared to 50% of the male candidates. Girls on average score lower points than boys

in every subject (Mathema and Bista 2005, 53). Among ethnic groups, Newars, Brahmans and Chhetris score the highest pass percentage, whereas Janjatis and Dalits are among the lowest performing groups (Mathema and Bista, 2005, 53). These statistics highlight the existing disparities in SLC scores across gender, ethnicity and school type.

3 Data and Methods

My research uses an existing survey conducted by Nepal's Ministry of Education with support from the World Bank. The data was collected through a large nationwide survey of schools, students and families in the years 2004-2005. The dataset is unique at the student level and contains 18,847 observations. In addition to the availability of data on primary variables of interest such as student access to technology (electricity, radio, TV and computer) and student Grade 10 test scores, the survey also includes data on socioeconomic, demographic, parental and school characteristics which are controlled for in the econometric analyses.

Socioeconomic variables include wealth index, cash income bracket, time taken to reach school and number of hours per day spent on household chores. Demographic variables include whether or not students are males, speak Nepali at home, live in a joint family structure and belong to a high caste group. Parental characteristics include whether or not students have a literate mother, a literate father and whether guardians guide in studies, talk to school at least 12 times a year and want their children to do a master's degree. School characteristics include whether school is located in a district headquarters, is private, has *pucca*[1] building and a well-built roof. These socioeconomic, demographic, parental and school characteristics are the control variables used in this analysis.

[1] *Pucca* is a "term used in South Asia that indicates dwellings that are solid, permanent and strongly built with substantial material." (Source: Wikipedia)

My research methodology primarily takes advantage of econometric tools for quantitative data analyses. I employ three methods: (i) simple ordinary least squares (OLS) regression model, (ii) logit probability model and (iii) matched OLS regression model using matching estimators. The OLS regression model in general is appropriate in exploring the linkage between an input variable and an outcome variable. In this research, the research methodology not only helps identify the direction of relationship, but it also helps quantify the impact of access to technology on student test scores. The OLS regression model also allows to control for other variables that contribute to improved student test scores. The methodology enables researchers to isolate the impact of the main independent variable on the primary dependent variable and draw causal inferences regarding access to technology and student outcomes. In my methodology, I repeat the same OLS regression model above twice to break down the estimates for richer and poorer households. Likewise, the logit probability model computes the probability that each student in a group has access to a computer, radio, TV or electricity. The model also allows a more formal analysis of the determinants of the ownership of a computer within its framework. Similarly, probability estimates allow for matching of students within each group such that the average differences in their learning outcomes can be possibly attributed to access to technology. This tool helps compare the learning outcomes of students who are similar in terms of observable characteristics.

In this research, I first conduct summary statistics for the entire dataset and observe the mean differences in test scores among students with and without access to technology. I then employ simple OLS regression model for the entire dataset with district fixed effects, which account for unobservable heterogeneity in student characteristics at the district level. I cluster the standard errors at the village level. Second, based on the median annual cash income of the entire

sample, I break down up my dataset into two groups: rich households (with an annual salary of Nepalese Rupees 60,000[2] or higher – equivalent to approximately US $580 or higher) and poor households (with an annual salary less than Nepalese Rupees 60,000 or US $580) and employ simple OLS regression model for both groups separately. Dividing the sample into two groups helps better attribute the differences in test scores to differences in access to technology.

Third, I use a logit probability model to determine the likelihood of an individual student owning a computer. I make probability estimates for students belonging to both rich households and poor households. Fourth, I rank these probability estimates and use the median probability estimate to further divide the dataset into two groups. Within each group of poor and rich households, students are further sub-grouped as "less likely to own a computer" and "more likely to own a computer". If a student's likelihood of owning a computer is lower than 50th percentile of the probability distribution, s/he is included in the "less likely to own a computer" sub-group within each group. Similarly, if a student's likelihood of owning a computer is in the top 50th percentile of the probability distribution, s/he is included in the "more likely to own a computer group" sub-group within each group. I then interact the ownership binary variable with rich as well as poor household binary variable. Finally, I run a matched OLS regression model for both rich and poor household groups with test scores as the dependent variable, actual computer ownership and likelihood of computer ownership as the independent variables, and other control variables with district fixed effects. I cluster standard errors at the village level.

[2] One $US = 104 Nepalese Rupees (as of March 27, 2018)

The following model outlines my empirical strategy:

$$Test\ Score_{ij} = \beta_0 + \beta_1 Tech_{ij} + X_{ij}\beta_2 + \beta_3 District_j + \epsilon_{ij}$$

Where is $Test\ Score_{ij}$ is the total test score for a student *i* living in village *j*, $Tech_{ij}$ is a binary variable that takes a value of 1 if an individual has access to technology and 0 otherwise. Technology includes access to radio, television, electricity and computer. X_{ij} is a vector of parental, school and individual student controls. $District_j$ is a vector of district-level dummies that account for geographical heterogeneity and unobserved fixed (time- invariant) factors at the district level. ϵ_{ij} is an error term.

4 Summary Statistics

This section first provides a summary of descriptive statistics for the primary independent variables and main outcome variable while highlighting the mean differences in test scores among students with varying levels of access to technology. It then summarizes descriptive statistics for control variables that account for socioeconomic, demographic, parental and school characteristics.

I. Descriptive statistics of primary independent variables and main outcome variable:

Table 1 below summarizes the descriptive statistics (mean, standard deviation, minimum and maximum) of each variable in the dataset. There are 17,751 observations in total for each variable. Most of these variables are binary, which means that they take a value of zero if an observed characteristic is absent and a value of one if the observed characteristic is present. For example, a variable takes a value of one if a student has access to electricity at home and a value of 0 if a student doesn't have access to electricity at home.

Table 1 – Descriptive Statistics

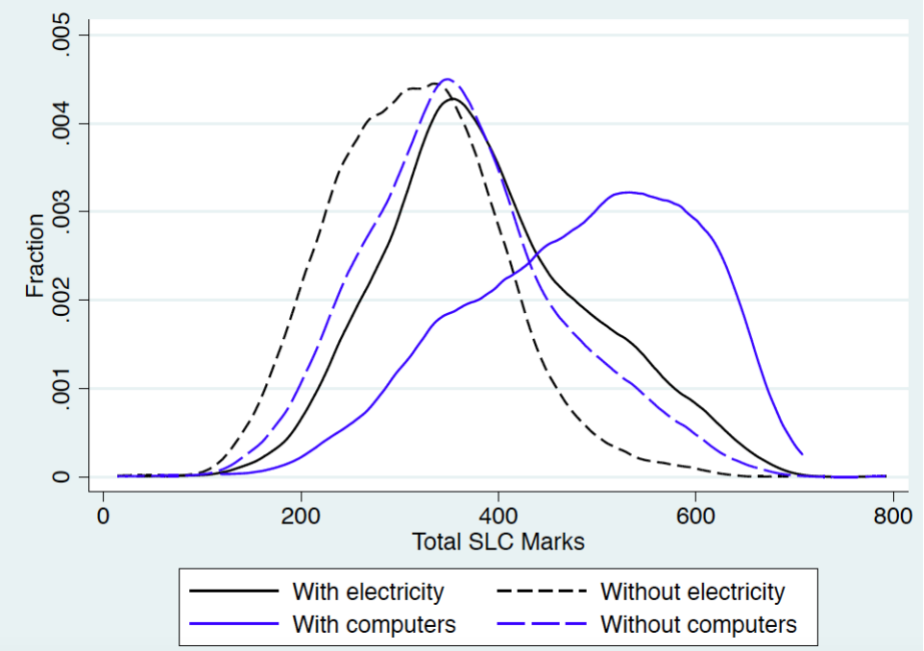
Variable	Mean	Standard Deviation	Min	Max
Total Test Scores	373.12	105.68	14	792
Electricity at home	0.76	0.42	0	1
TV at home	0.6	0.49	0	1
Radio at home	0.93	0.25	0	1
Computer at home	0.07	0.25	0	1
High caste	0.58	0.49	0	1
Male	0.55	0.5	0	1
Nepali language spoken at home	0.74	0.44	0	1
Joint family structure	0.34	0.47	0	1
Wealth Index	2.96	1.15	0	6
Annual cash income (<Nrs. 7,000)	0.04	0.2	0	1
Annual cash income (Nrs. 7,000 - 12,000)	0.05	0.23	0	1
Annual cash income (Nrs. 12,000 - 18,000)	0.05	0.21	0	1
Annual cash income (Nrs. 18,000 - 24,000)	0.05	0.22	0	1
Annual cash income (Nrs. 24,000 - 30,000)	0.09	0.29	0	1
Annual cash income (Nrs. 30,000 - 60,000)	0.24	0.43	0	1
Annual cash income (Nrs. 60,000 - 120,000)	0.3	0.46	0	1
Annual cash income (Nrs. 120,000 - 200,000)	0.11	0.31	0	1
Annual cash income (Nrs. 200,000 - 300,000)	0.03	0.18	0	1
Annual cash income (Nrs. > 300,000)	0.02	0.13	0	1
Annual cash income (Not Reported)	0.01	0.11	0	1
Time taken to reach school in minutes	29.65	29.67	0	480
Time spent per day in household chores in hours	2.87	1.66	0	10
Literate father	0.88	0.32	0	1
Literate mother	0.59	0.49	0	1
Parents guide studies	0.75	0.43	0	1
Parents talk to school at least 12 times a year	0.2	0.4	0	1
Parents want children to do a master's degree or above	0.6	0.49	0	1
School located in district headquarter	0.26	0.44	0	1
School is private	0.21	0.41	0	1
School has *pucca* building	0.89	0.31	0	1
School has well-built roof	0.92	0.27	0	1

Examining student access to technology (electricity, radio, TV and computer) as the main independent variable, I find that out of 18,847 students, 76% have access to electricity at home, 93% have access to a radio at home, 60% have access to a TV at home and only 7% have access to a computer at home. The four groups with access to electricity, TV, radio and computer are not mutually exclusive implying that those with radio, TV and computer will also have access to electricity at home. In this sample, 71% have access to both electricity and radio at home, 55% have access to electricity, radio as well as TV at home, and only 6% have access to all four proxies of technology including computers at home.

Likewise, examining Grade 10 national level examination as the main dependent variable, I find that the average student test score is 373 points out of 800. The variation across individual test scores is high given that the maximum test score is 792 points out of 800 (3.95 in terms of normalized test scores) and the minimum test score is only 14 points out of 800 (-3.38 in terms of normalized test scores). The student test scores have a high standard deviation of approximately 106.

Figures 1 below contains density plots that capture the mean differences in test scores between students with and without access to two proxies for technology (electricity and computer at home). The graph indicates that students with access to electricity and computer at home, have higher average total test scores. In both figures, wider plots indicate higher variances in student test scores. Particularly, there is a wider variance in test scores among students with and without access to a computer at home, when compared to students with and without access to electricity. In other words, those with computers, on average, have much higher total test scores.

Figure 1 – Total test score with and without access to electricity and computers



Specifically, Figure 1 shows that students with access to electricity at home have test scores of roughly 484 out of 800 whereas those without access to electricity have test scores of roughly 365 out of 800. Likewise, students with access to a computer at home have test scores of roughly 550 out of 800 whereas those without access to computer at home have test scores of roughly 350 out of 800.

II. Descriptive statistics of control variables:

In this dataset, wealth index, annual cash income, time taken to reach school and number of hours per day spent on household chores account for *socioeconomic control variables*.

Wealth index is a categorical variable, taking values from zero to six. A student with a wealth index level of zero means that s/he belongs to a household with no ownership of a house, additional house/s, land, vehicle, cattle and family business. In other words, a student with a wealth index of zero belongs to an extremely poor household. On the other hand, an index level of six

indicates that a student belongs to a rich household that owns all six items. In other words, higher the value, wealthier the student's family.

On an average, a typical student in this dataset has a wealth index of 2.96 with a standard deviation of 1.15. This means that most students belong to households that own three aforementioned items on average. The wealth variance among students in the dataset is wide with a minimum value of zero and a maximum value of six. There is a wide variance in annual cash income among households that students belong to. As reported in Table 1, more than 50 percent of students in the dataset belonged to households that had an annual cash income of less than US $600.

Likewise, another socioeconomic control variable is average time taken to reach school. I find that it takes students almost thirty minutes on average to reach school. The variation in time taken to reach school is also high, with some students falling on two extreme ends of the spectrum. For some students in the dataset, it takes them less than a minute to reach school. On the other hand, one student in the dataset needed to travel 8 hours in order to reach school. This could be because the students are boarding elsewhere for school or that they are enrolled in a school that is faraway and do not actually attend the school on an everyday basis.

Similarly, average number of hours spent on household chores per day is another socioeconomic control variable. I find that students spend almost 3 hours per day on household chores. The variations are wide and indicate varying levels of household responsibilities among students. Some students in the dataset do not spend any amount of time per day on household chores whereas some student spend 10 hours per day on household chores. In a developing country setting like Nepal, some students maybe enrolled in schools, but their school attendance maybe

poor because they either work full time in their family farms or are employed as domestic help by richer and urban households.

In this dataset, students' gender, caste, language spoken at home and family structure account for *demographic control variables*. 55% of students are males and 45% of the students are females. Similarly, on an average, 57% of the students in the sample belong to a high caste household. This implies that 43% of the students in the household belong to a household that may have been socially and economically marginalized historically. Likewise, on an average, 74% of the student in the sample speak the national official language, Nepali, at home. This implies that 36% of students in the sample speak a different mother tongue language at home which is not assessed in the Grade 10 national level examinations. Additionally, 34% of students in the sample belong to a household with a joint or extended family structure. This implies that household resources are often shared beyond the immediate nuclear family to include grandparents, aunts, uncles and cousins as well.

Similarly, parental characteristics are controlled for in this analysis using variables such as mother's literacy, father's literacy, parents' communication with school at least 12 times a year, parental involvement in guiding children's studies and parents' desire to want their children to do a master's degree or above. I find that 88% of students' fathers were literate compared to only 59% of the mothers. This figure highlights a potential societal bias towards the male child in a historically patriarchal society. A higher proportion of literate fathers compared to mothers indicates a higher prioritization of education for the male child when resources are constrained. Likewise, I also find that only 20% of students have parents who talk to school at least 12 times a year. This figure highlights a potential communication and partnership gap between parents, teachers and school administrators in supporting children's educational outcomes. On the bright

side, 75% of students have guardians who guide them in their studies and 60% of students have parents who wants their children to do master's degree or above. Though the degree and extent of parental guidance and motivation is unclear, this figure is still an encouraging evidence of increasing parental involvement and aspirations in children's education in a developing country setting.

Finally, school characteristics are controlled for in this analysis using variables such as school location in a district headquarter, school's private versus public status and school's physical infrastructure measured by *pucca* building and well-built roof. I find that only 26% of students attend schools located in the district headquarters. This indicates that 74% of schools in this sample are located in non-central locations and are potentially under resourced or minimally administered and monitored by local government authorities. I also find that 79% of students in this sample attend a public school and only 21% of students attend private schools. This implies that only a fifth of students in this sample reside in major cities and towns where private schools are more abundant or belong to households that can afford to pay private school fees. With regards to school infrastructure, 89% of students go to schools that have a *pucca* building and 92% of students go to schools that have a well-built roof. This implies that most students in this sample had access to classroom spaces that were generally conducive for learning.

5 Results

This section first states and interprets results of the simple OLS regression model for all students in the sample. It then breaks down and interprets results for simple OLS regression model, logit probability model and matched OLS regression for students belonging to rich versus poor

households. All regression analyses include control variables[3] for the aforementioned socioeconomic, demographic, school and parental characteristics as well as district fixed effects.

I. Results of simple OLS regression model for all students in the sample:

Table 2 reports the differences in test scores across four groups of interest: students with and without access electricity at home, students with and without access to radio at home, students with and without access to TV at home and students with and without access to TV at home. A more detailed table with results for control variables is available in the Appendix. In Table 2, the first column runs a pooled regression model, including all four binary variables (access to electricity, radio, TV and computer) in a single regression specification. It shows that students with access to electricity score 16 points more than those without electricity at home. Those with access to a radio score almost 14 points higher than those without a radio at home. Those with access to a TV score 24 points more than those without a TV at home. Those with access to a computer score 64 points higher than those without a computer at home. All point estimates are statistically significant at the 1% level. There is particularly a pronounced effect among students with access to computer. A difference of 64 points corresponds to a total test score that is 8 percentage points higher overall out of 800, suggesting that the 64 points difference is not only statistically significant but also economically significant.

Similarly, Columns 2 to 5 run a similar regression model but explore each variable (access to electricity, radio, TV and computer) separately. The direction of relationship between the variables are same but the estimates are slightly higher when differences in test scores are explored separately for each variable separately. Results show that students with access to electricity score 32 points more than those without electricity at home. Those with access to a radio score 16 points

[3] Please check the Appendix to review results for control variables.

more than those without a radio at home. Those with access to a TV score 35 points more than those without a TV at home. Those with access to a computer score 70 points more than those without a computer at home.

Table 2 – Simple OLS Regression Results for All Students

Variables	*Dependent Variable: Total Test Scores*				
Electricity at home	16.054***	32.182***			
	(2.657)	(3.694)			
TV at home	24.131***		35.525***		
	(5.264)		(5.179)		
Radio at home	13.776***			16.799***	
	(3.16)			(3.088)	
Computer at home	64.855***				70.435***
	(9.911)				(9.891)
Socioeconomic Controls	✓	✓	✓	✓	✓
Demographic Controls	✓	✓	✓	✓	✓
School Controls	✓	✓	✓	✓	✓
Parental Controls	✓	✓	✓	✓	✓
District Fixed Effects	✓	✓	✓	✓	✓
R squared	0.382	0.351	0.358	0.34	0.363
N	18,847	18,847	18,847	18,847	18,847

Standard errors in parentheses
* p<0.1 ** p<0.05 *** p<0.01

II. Results of simple OLS regression model for students belonging to rich vs. poor households:

Table 3 reports the differences in test scores across four groups of interest: students with and without access electricity at home, students with and without access to radio at home, students with and without access to TV at home and students with and without access to TV at home, by

breaking down the OLS estimates for rich households and poor households.[4] A more detailed table with results for control variables is available in the Appendix. Column 1 reports the mean differences in student test scores among rich households and column 2 reports the mean differences in student test scores among poor households with and without access to the aforementioned technology proxies.

Table 3 – Simple OLS Regression Results for Students belonging to Rich versus Poor Households

	Total Test Scores (Rich households)	Total Test Scores (Poor Households)
Electricity at home	19.595***	12.715***
	(3.339)	(2.83)
TV at home	27.604***	16.136***
	(6.202)	(4.469)
Radio at home	8.355*	13.007***
	(4.636)	(3.307)
Computer at home	62.723***	51.478***
	(11.541)	(6.785)
Socioeconomic Controls	✓	✓
Demographic Controls	✓	✓
School Controls	✓	✓
Parental Controls	✓	✓
District Fixed Effects	✓	✓
N	8686	9943
R squared	0.369	0.368

Standard errors in parentheses
* p<0.1 ** p<0.05 *** p<0.01

First, let's consider the results for students belonging to rich households. I find that students with access to electricity score almost 20 points higher than those without electricity at home. Those with access to a radio score 8 points higher than those without a radio at home. Those with

[4] Rich households have an annual salary of Nepalese Rupees 60,000 or higher (equivalent to approximately US $580 or higher) and poor households have an annual salary less than Nepalese Rupees 60,000 or US $580.

access to a TV score 27 points higher than those without a TV at home. Similarly, those with access to a computer score 62 points higher than those without a computer at home.

Now let's consider the results for students belonging to poor households. I find that students with access to electricity score 12 points higher than those without electricity at home. Those with access to a radio score 13 points higher than those without a radio at home. Those with access to a TV score 16 points higher than those without a TV at home. Similarly, those with access to a computer score 51 points higher than those without a computer at home.

This suggests that the effect of access to electricity, TV and (particularly) computers on student test scores is more pronounced among rich households compared to poor households. On the other hand, the effect of radio on student test scores is more pronounced on poor households compared to rich households.

III. Logit probability model results for students belonging to rich versus poor households:

The logit probability model generates a probability of owning a computer for each student in the entire sample. Table 4, column 1 explores the determinants of computer ownership for students belonging to rich households. The model estimates which variables determine computer ownership as well as computes the likelihood of computer ownership for each characteristic. A total of 8,243 observations are included in this analysis of rich households. Variables such as caste, annual cash income between Nepalese Rupees 60,000 and 120,000 (US $577 - $1,154), annual cash income between Nepalese Rupees 120,000 and 200,000 (US $1,154 - $1,923), annual cash income between Nepalese Rupees 200,000 and 300,000 (US $1,923 - $2,885), father's literacy, mother's literacy, parental guidance in studies, parents' desire to want their children to do a master's degree or above, school type, and time spent on daily household chores are statistically significant in this analysis.

Table 4 – Probability Estimates for Students belonging to Rich versus Poor Households

Determinants of Computer Ownership	Probability Estimates (Rich Households)	Probability Estimates (Poor Households)
High Caste	-0.0198***	-0.00488
Male	0.000441	-0.00288
Nepali spoken at home	0.000412	0.000274
Joint family structure	0.00352	0.00484
Wealth Index	-0.000732	0.00411***
Cash Income Level 1		0.00985
Cash Income Level 2		0.00443
Cash Income Level 3		0.0109***
Cash Income Level 4		0.00584
Cash Income Level 5		0.00784
Cash Income Level 7	-0.0812***	
Cash Income Level 8	-0.0322***	
Cash Income Level 9	-0.0173***	
Literate Father	0.0221**	0.00662*
Literate Mother	0.0304***	0.00994***
Time taken to reach school	0.000152	-0.0000398
Parents guide in studies	0.0220***	0.00379*
Parents talk to school at least 12 times a year	-0.00281	0.000735
Parents want children to do a master's	0.0225***	0.0109***
School located in district headquarter	0.0232	0.0164***
School is private	0.110***	0.0520***
School has *pucca* building	-0.0000454	-0.00019
School has well-built roof	0.00176	0.00415
Time spent on household chores	-0.00821***	-0.00336***
N	8243	9515

* p<0.1, ** p<0.05, *** p<0.01

As indicated in column 1 of Table 4, I find that among rich households, students belonging to a high caste group are almost 2% less likely to own a computer. I also find that students belonging to the annual cash income brackets between Nepalese Rupees $12,000 - $24,00 (US

$115 - $173), Nepalese Rupees 120,000 and 200,000 (US $1,154 - $1,923) and Nepalese Rupees 200,000 and 300,000 (US $1,923 - $2,885) are also 8.1%, 3.2% and 1.1% less likely to own a computer. Additionally, a student whose father is literate is 2.2% likely to own a computer whereas a student whose mother is literate is almost 3% likely to own a computer. I also find that a student who is guided by a parent in his/her studies is 2.2% likely to own a computer and a student whose parents want their child to do a master's degree or above is 2.3% likely to own a computer. Likewise, a student who attends a private school is 11% likely to own a computer. Additionally, the likelihood of a student in a rich household owning a computer decreases by 0.8 percentage points when a s/he spends an additional minute per day on household chores.

Similarly, Table 4, column 2 explores the determinants of a computer ownership for students belonging to poor households. A total of 9,515 observations are included in this analysis of poor households. There are variables such as wealth index, annual cash income between Nepalese Rupees $12,000 - $24,00 (US $115 - $173), father's literacy, mother's literacy, parental guidance in studies, parents' desire to want their children to do a master's degree or above, school location, school type, and time spent on daily household chores that are statistically significant in this analysis.

As indicated in column 2 of Table 4, I find that among poor households, students with a higher wealth index are 0.4% likely to own a computer. I also find that a student belonging to the annual cash income bracket between Nepalese Rupees $12,000 - $24,00 (US $115 - $173) is 1.1% likely to own a computer. Additionally, a student whose father is literate is 0.6% likely to own a computer whereas a student whose mother is literate is almost 1% likely to own a computer. I also find that a student who is guided by a parent in his/her studies is 0.38% likely to own a computer and a student whose parents want their child to do a master's degree or above is 1.09% likely to

own a computer. Likewise, a student who attends a school located in a district headquarter is 1.64% likely to own a computer and a student who attends a private school is 5.2% likely to own a computer. Additionally, the likelihood of a student owning a computer decreases by 0.34 percentage points when a student spends an additional minute per day on household chores.

Overall, there were marginal effects of most characteristics on the likelihood of a student owning a computer among both poor households and rich households. The few expectations to these marginal effects are further discussed in Section 7. It is important to note that the logit-probability model is used to generate probability estimates on an individual's likelihood of access to a given technology. These probability estimates will be used to match students of similar socioeconomic strata, which further allows to isolate the impact of technology on test scores of students.

IV. Matched OLS regression model results for students belonging to rich versus poor households:

Using the probability estimates from the logit probability model, I ran a matched OLS regression model for students belonging to rich households as well as poor households. As seen in Table 5, the first two columns correspond to student test scores among rich and poor households respectively. A more detailed table with results for control variables is available in the Appendix.

First, let's consider column 1 in Table 5 containing the sample in which students belong to rich households. Among rich students who are less likely to own a computer based on the logit model, rich students who actually own a computer score 56 points higher than rich students without access to a computer. Likewise, among rich students who are more likely to own a computer based on the logit model, rich students who actually own a computer score 13.4 (55.91 minus 42.51) points higher than rich students without access to a computer.

Table 5 – Matched OLS Regression Results for Students belonging to Rich versus Poor Households

Variables	Total Test Scores (Rich Households)	Total Test Scores (Poor Households)
Actually own computer at home	55.912***	63.385***
	(13.867)	(6.008)
Likely to own computer at home	-66.799***	-33.122***
	(8.566)	(5.154)
Actually own computer*Likely to own computer	-42.519**	-58.202***
	(17.206)	(13.265)
Socioeconomic Controls	✓	✓
Demographic Controls	✓	✓
School Controls	✓	✓
Parental Controls	✓	✓
District Fixed Effects	✓	✓
N	8219	9452
R-squared	0.435	0.383

Standard errors in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Now, let's consider column 2 in Table 5 containing the sample in which students belong to poor households. Among poor students who are less likely to own a computer based on the logit model, the mean difference in test scores between poor students who actually own a computer versus poor students without access to a computer is 63.4 points. Likewise, among poor students who are more likely to own a computer based on the logit model, the mean difference in test scores between poor students who actually own a computer versus poor students without access to a computer is 5.2 (63.39 minus 58.2).

These estimates suggest that the impact of access to computers is still positive when we match students based on likelihood of owning a computer. The positive effect appears to be more pronounced among students that are less likely to own a computer, compared to students that are more likely to own a computer. These estimates show that computers have an education value even when socioeconomic, demographic, parental and school controls characteristics are controlled for using a matching technique. Given that both matched OLS and simple OLS models represent similar estimates, the results demonstrate that the effect of computer on test scores of students is strong and significant.

6 Discussion

The descriptive statistics and results shed several insights on the accessibility and role of educational inputs like technology in improving student academic achievement in Nepal.

First, let's consider the findings from the descriptive statistics. I find that though Nepalese students' access to electricity, radio and TV at home have significantly improved, only 7% of the 17,751 students included in this study have access to a computer at home. Though it is likely that these estimates from 2004-2005 may have improved by 2018, the proportion of students owning a computer appear significantly low when compared to that of other nations. Likewise, I also find wide variations in socioeconomic, demographic, parental and school characteristics among students studied in this sample. Most of the population has low levels of income which makes computer accessibility an issue for majority of the population. In my sample of observations, 52 percent of the students belonged to a poor household where the annual cash oncome was Nepalese rupees 60,000 or US $577 a year or less.

Similarly, I find that the average student test score is quite low at 373 points out of 800. I find that only 21% of students in the sample attend private schools. Of the students who were

enrolled in school and who are represented in the survey, 55% are boys and 45% are girls. I also that students' mothers' literacy rates are much lower compared to that of fathers. I also find that it is more difficult for some students to reach school compared to others. Similarly, I find that it is challenging for some students to devote time outside of school on academic learning due to long hours devoted to household chores.

Now let's consider the findings from my results. I find that Nepalese students with access to electricity, radio, TV and computer at home, have higher average total test scores. Among all technology proxies, access to computer has the largest impact on student academic achievement. Simple OLS estimates have allowed me to quantify this pronounced effect of access to computer on student test scores. On average, access to computer at home increases the average test score by 8 percentage points in the context of the Grade 10 national level examinations. Given that access to electricity is crucial in operating computers at home, the results suggest the importance of student access to both computers as well as electricity. This is especially more relevant in the context of this data, when use of laptops was almost nonexistent.

Likewise, breaking down the OLS estimates for rich and poor households, I find that the effect of access to electricity, TV and (particularly) computers on student test scores is more pronounced among rich households compared to poor households. On the other hand, the effect of radio on student test scores is more pronounced on poor households compared to rich households. This implies that students belonging to rich households benefit more from access to electricity, TV and computers compared to their peers who belong to poor households. Likewise, though the magnitude of impact on test scores via radio is much smaller compared to that of computers, students from poorer households benefit more from access to a radio. It is possible that students in poor households are more likely to listen to the radio in lieu of watching a TV or spending time on

a computer due to potential lack of ownership of these items at a household level. It is also likely that children in a poor household are possibly benefiting from any potential airing of educational and general knowledge programs shared on the platform.

Similarly, looking at the logit probability model, most variables have marginal impact on the likelihood of a student owning a computer among both poor households and rich households. However, it is important to note that a student's attendance in a private school has the highest probability of a student owning a computer. For rich students attending private school, his/her likelihood of owning a computer at home is 11%. For poor students attending a private school, their likelihood of owning a computer is 5.2%. It is possible that students enrolled in a private school are also learning basic computer skills at school and may also be required to complete assignments at home demanding the use of computer applications. Though rich households are more likely to own a computer and sending children to private schools, I control for such unobservable characteristics using many other characteristics available in the data and by using district fixed effects.

Additionally, the likelihood of owning a computer is higher for a child when the mother is literate compared to the father. For a student in a rich household whose mother is literate, the likelihood of him/her owning a computer at home is 0.8 percentage point higher than when a father is literate. Likewise, for a student in a poor household whose mother is literate, the likelihood of him/her owning a computer at home is 0.4 percentage point higher than when a father is literate. Though the probability estimates are marginal, it implies that mothers may be slightly more willing than fathers to invest in an education input like a computer for her child.

Furthermore, it is interesting to note that among rich households, students' belonging to a high caste and a household with high cash income level between Nepalese Rupees 60,000 and

300,000 (US $577 - $2,885) don't necessarily translate into increased probability of owning a computer. There are multiple reasons for why this might be happening. First of all, a high caste family may not necessarily be wealthy and able to afford a computer at home. Second, computers may not have penetrated the Nepalese market as widely in 2005 compared to other nations. Households that owned a computer at home during this time period may have usage that were limited to Microsoft Office applications, pre-installed computer games, movie viewing and email accessibility. Computer purchases may still pose significant costs to families who earn between US $577-$2,885 a year. Computer as a technology may still have been regarded as a luxury instead of a need by Nepalese families during this time. Third, families earning relatively high levels of cash income may be more well-informed and hence more cautious of potential negative repercussions of prolonged computer use and screen time dissuading them from purchasing the device altogether.

Additionally, using probability estimates for matched OLS regression model, the effect of owning a computer on student test scores is still positive among both rich and poor households. It is important to note that using this approach, the positive effect appears to be more pronounced among students that are less likely to own a computer, compared to students that are more likely to own a computer. This implies that access to a computer has a larger positive impact on student populations who are less likely to own one. Particularly, among poor students who are less likely to own a computer based on the logit model, the mean difference in test scores between poor students who actually own a computer versus poor students without access to a computer is 63.4 points. Using the matched OLS estimates, the effect of owning a computer is 7 points higher for poor students who are less likely to own a computer compared to rich students who are less likely to own a computer.

Given these findings, there are three main strengths of my research. First, my research makes use of rich and large dataset. Though the data dates back to 2004-2005, this is the most extensive survey data available on Nepalese students. Second, this work contributes to the existing literature on the positive impact of educational inputs like technology on student academic achievement. Third, my research employs a rigorous quantitative methodology using multiple control variables, break down of estimates for rich and poor households, and probability estimates for refining the observed effect of technology on student test scores.

Despite the strengths of this research, there are some limitations that must be addressed in future work to further strengthen the implications of my research. First of all, despite the rigorous quantitative methodology, there is still a potential for selection bias and reverse causality in my results. Though the OLS estimates were broken down multiple times for richer and poorer households, future research will still need to account for other characteristics such as teacher motivation, student access to computers at school, students' learning styles and prior academic history to reduce the impact of selection bias and reverse causality. Likewise, future education surveys conducted by the Nepal government must include questions on students' internet usage and mobile phone accessibility as well as teachers' integration of computers in curriculum. Second, while the survey has rich data, it is still relatively old given that access to computers, internet connectivity and mobile phones have significantly improved across the world in the last decade. Third, the dependent variable, student test scores, unfortunately focuses on only one aspect of student achievement, i.e. cognitive outcomes of children. Focusing solely on student performance on test scores as an outcome metric can undermine students' overall learning experience and their development of non-cognitive skills such as participation in extracurricular activities and team building, both of which are often highly valued by the labor market. Finally, this work can further

benefit from a mixed methods approach to research design that combines quantitative research with qualitative evidence. Though I had worked in a rural education setting in Nepal in the past, my involvement at the time was largely focused on school infrastructure and non-cognitive skills. The ability to reexamine schools in Nepal with a sharp and critical lens towards technology accessibility could further strength the scope of this work.

7 Policy Implications

This research suggests that Nepalese students' academic achievement in the Grade 10 national exams could improve significantly if students have better access to technology, particularly computers. Though some studies in existing literature suggest mixed relationship between computer access and student outcomes (Barrera-Osorio and Linden 2009, 2; Trucano 2005, 1; Reich and Ito 2017, 3), the quantitative evidence from my research highlights the potential benefit of student access to technology, particularly computers, in the context of Nepal. Though a single policy does not fit all contexts and therefore cannot be applied across multiple settings, it is nonetheless crucial to learn from well-intended education technology programs that had sub-optimal outcomes and subsequently incorporate the lessons for a successful policy design.

Given that majority of Nepalese families have low annual cash income, I recommend the government of Nepal to make computers more affordable for student use, make provisions for improved access to computers and provide general computer literacy training in public schools and spaces, particularly in areas where students live far away from the district headquarters. The government of Nepal can use multiple ways to increase computer accessibility among its students who attend public schools and belong to rural and poor households. The government must conduct a needs assessment and feasibility study involving relevant stakeholders in a rural public school. If the benefits of increased student academic achievement and higher long-term human capital

accumulation outweigh the costs of an initial pilot investment in a district, the government must put forward a policy design and implementation plan.

The plan can include programs such as provision of subsidies for computer purchases, establishment of public computer stations, establishment of a computer lab in public schools, introduction of a computer class for learning basic skills, and regular availability of trainers who share computer skills and technological knowledge. This plan can first be piloted at an underperforming public school and can eventually be scaled up to include other schools and districts. Lessons learned along the way can be incorporated in the next implementation stages. Likewise, educational radio could also be a good investment for the government given that majority of the households in this sample already have access to a radio at home.

Nepal's government, particularly the Ministry of Education, has an important role to play in making access to electricity, TV, radio and computers more accessible to students. Particularly, the government can integrate technology as part of its education sectoral strategy. An increased student access to technology, particularly computers, along with proper teacher training and parental guidance can spur positive effects on student academic achievement. Likewise, a strong collaboration between government stakeholders, school administrators, teachers and parents will be crucial in ensuring the success of this program. By leveraging technology, ensuring teacher/parental guidance and promoting an environment for knowledge sharing, Nepalese policymakers have an opportunity to help students improve their learning outcomes.

8 Conclusion

This paper uses detailed student-level data on national level examination to investigate the role of technology in improving student academic achievement in a developing country setting. Using simple linear regression modeling approach, the paper finds significant mean differences in test scores between students with and without access to technology. Specifically, students with access to computers score 64 points (approximately 8 percentage of the maximum possible score) higher than their counterparts without access to computers. The positive relationship between technology and test scores is robust across multiple empirical specifications that rely on matching technique to account for potential confounding factors such as income. Given that estimates from matching technique provide similar results, this gives additional confidence that methodology employed in this study does a reasonable job in isolating the impact of technology on test scores and minimizing the role of confounding variables. Moreover, the estimates are positive and statistically significant when different proxies of technology such as radio, television and electricity are used.

To the best of my knowledge, this is the first empirical study that aims to tease out the impact of technology on test scores in the context of Nepal. Although the study applies matching technique to minimize potential bias originating from possible correlation between technology and some unobservable characteristic, future work will benefit from a more rigorous approach to account for this problem. While it is beyond the scope of this study to apply an instrumental variable approach or a quasi-experimental technique to account for possible bias, the findings of the paper are still important as they provide some evidence that technology in a developing country setting leads to improved educational outcomes.

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Appendix

Table 2.1 – Simple OLS Regression Results for All Students with Control Variables Listed Out

Variables	*Dependent Variable: Total Test Scores*				
Electricity at home	16.054***	32.182***			
	(2.657)	(3.694)			
TV at home	24.131***		35.525***		
	(5.264)		(5.179)		
Radio at home	13.776***			16.799***	
	(3.160)			(3.088)	
Computer at home	64.855***				70.435***
	(9.911)				(9.891)
High Caste	6.461***	5.992***	6.144***	6.137***	6.638***
	(2.067)	(2.178)	(2.160)	(2.180)	(2.093)
Male	19.768***	19.770***	19.786***	19.607***	19.575***
	(1.812)	(1.837)	(1.802)	(1.783)	(1.771)
Nepali spoken at home	-4.189*	-3.366	-3.349	-2.978	-3.525
	(2.381)	(2.585)	(2.428)	(2.429)	(2.306)
Joint family structure	-4.191**	-3.895**	-4.043**	-3.923**	-4.131**
	(1.651)	(1.705)	(1.676)	(1.678)	(1.620)
Wealth Index	-1.568*	-1.290	-1.363*	-1.176	-1.335*
	(0.782)	(0.804)	(0.810)	(0.807)	(0.772)
Cash Income Level 1	-0.471	-1.509	-2.481	-2.299	-0.668
	(9.344)	(9.810)	(10.000)	(9.726)	(8.957)
Cash Income Level 2	-6.858	-7.857	-9.049	-8.664	-6.870
	(9.068)	(9.899)	(9.935)	(9.828)	(8.795)
Cash Income Level 3	-1.736	-2.727	-3.375	-3.492	-2.081
	(8.771)	(9.481)	(9.594)	(9.473)	(8.592)
Cash Income Level 4	-9.062	-9.807	-10.715	-10.600	-9.151

	(8.395)	(9.152)	(9.248)	(9.162)	(8.226)
Cash Income Level 5	-8.374	-9.055	-9.554	-9.330	-8.007
	(8.543)	(9.216)	(9.350)	(9.254)	(8.418)
Cash Income Level 6	-2.745	-3.706	-4.268	-3.925	-2.245
	(8.277)	(9.003)	(9.111)	(8.978)	(8.056)
Cash Income Level 7	0.037	-0.640	-1.322	-0.673	0.920
	(8.767)	(9.268)	(9.507)	(9.280)	(8.466)
Cash Income Level 8	3.130	3.573	2.662	3.470	4.032
	(8.124)	(8.354)	(8.590)	(8.373)	(7.863)
Cash Income Level 9	6.755	8.410	7.511	8.384	7.682
	(8.115)	(7.899)	(8.349)	(7.949)	(7.684)
Cash Income Level 10	4.040	8.110	7.477	8.152	4.978
	(11.016)	(10.993)	(11.218)	(10.932)	(10.602)
Cash Income Level 11	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)
Literate Father	7.240***	7.464***	7.560***	7.852***	7.885***
	(1.770)	(1.754)	(1.727)	(1.732)	(1.718)
Literate Mother	5.213***	6.311***	6.064***	6.671***	5.908***
	(1.544)	(1.757)	(1.731)	(1.748)	(1.553)
Time taken to reach school	-0.083**	-0.082**	-0.089**	-0.099***	-0.103***
	(0.034)	(0.034)	(0.037)	(0.036)	(0.036)
Parents guide in studies	5.332***	6.008***	5.712***	5.968***	5.620***
	(1.841)	(1.795)	(1.845)	(1.781)	(1.844)
Parents talk to school	1.441	1.454	1.476	1.456	1.486
at least 12 times a year	(1.503)	(1.509)	(1.488)	(1.488)	(1.485)
Parents want children to	22.155***	22.543***	22.646***	22.989***	22.690***
do a Master's	(3.108)	(3.106)	(3.084)	(3.026)	(3.031)
School located in district hq.	10.611*	11.395*	11.885*	12.817**	12.222**
	(5.754)	(6.090)	(6.204)	(6.179)	(5.816)

School is private	97.216***	100.179***	99.785***	100.266***	97.529***
	(6.502)	(7.169)	(7.111)	(7.166)	(6.540)
School has *pucca* building	7.553	7.840	8.017	8.659	8.689
	(5.529)	(5.658)	(5.660)	(5.707)	(5.598)
School has well-built roof	1.142	1.008	1.018	0.781	0.707
	(3.452)	(3.498)	(3.564)	(3.545)	(3.460)
Time spent on	-2.481***	-2.662***	-2.643***	-2.731***	-2.606***
household chores	(0.580)	(0.597)	(0.580)	(0.574)	(0.565)
Intercept Term	309.651***	311.026***	315.402***	315.131***	315.774***
	(10.861)	(11.416)	(11.334)	(11.229)	(10.584)
N	18847	18847	18847	18847	18847
r2	0.382	0.351	0.358	0.340	0.363
Standard errors in parentheses					
* p<0.1	** p<0.05	*** p<0.01			

Table 3.1 - Simple OLS Regression Results for Students belonging to Rich versus Poor Households with Control Variables Listed Out

Variables	Total Test Scores (Rich Households)	Total Test Scores (Poor Households)
Electricity at home	19.595***	12.715***
	(3.339)	(2.830)
TV at home	27.604***	16.136***
	(6.202)	(4.469)
Radio at home	8.355*	13.007***
	(4.636)	(3.307)
Computer at home	62.723***	51.478***
Electricity at home	(11.541)	(6.785)

High Caste	6.539***	7.030***
	(2.422)	(2.468)
Male	18.050***	21.430***
	(2.399)	(1.700)
Nepali spoken at home	-3.961*	-5.226
	(2.091)	(3.229)
Joint family structure	-5.067***	-2.729
	(1.736)	(1.926)
Wealth Index	-2.321**	-0.353
	(1.011)	(0.654)
Cash Income Level 1	0.000	1.357
	(.)	(3.637)
Cash Income Level 2	0.000	-4.031*
	(.)	(2.237)
Cash Income Level 3	0.000	0.494
	(.)	(2.553)
Cash Income Level 4	0.000	-6.635***
	(.)	(2.139)
Cash Income Level 5	0.000	-6.059***
	(.)	(1.832)
Cash Income Level 6	0.000	0.000
	(.)	(.)
Cash Income Level 7	-2.629	0.000
	(4.197)	(.)
Cash Income Level 8	-0.199	0.000
	(3.953)	(.)
Cash Income Level 9	2.311	0.000
	(4.766)	(.)

Cash Income Level 10	0.000	0.000
	(.)	(.)
Cash Income Level 11	0.000	0.000
	(.)	(.)
Literate Father	10.854***	6.174***
	(2.598)	(2.093)
Literate Mother	9.054***	1.951
	(2.184)	(1.456)
Time taken to reach school	-0.080	-0.085***
	(0.054)	(0.029)
Parents guide in studies	6.886***	4.309**
	(2.319)	(2.084)
Parents talk to school at least 12 times a year	0.198	2.837
	(1.749)	(1.999)
Parents want children to do a Master's	27.308***	18.377***
	(3.893)	(2.587)
School located in district hq.	4.041	19.096***
	(8.329)	(3.054)
School is private	108.745***	80.670***
	(7.293)	(6.238)
School has *pucca* building	5.281	7.107
	(6.510)	(5.104)
School has well-built roof	0.482	1.061
	(4.143)	(3.902)
Time spent on Household chores	-2.217***	-2.395***
	(0.643)	(0.653)
Intercept Term	316.660***	302.474***
	(9.221)	(8.417)
N	8686	9943

R squared	0.369	0.368
Standard errors in parentheses		
* p<0.1	** p<0.05	*** p<0.01

Table 5.1 - Matched OLS Regression Results for Students belonging to Rich versus Poor Households with Control Variables Listed Out

Variables	Total Test Scores (Rich Households)	Total Test Scores (Poor Households)
Actually own computer at home	55.912***	63.385***
	(13.867)	(6.008)
Likely to own computer at home	-66.799***	-33.122***
	(8.566)	(5.154)
Actually own computer*Likely to own computer	-42.519**	-58.202***
	(17.206)	(13.265)
Intercept Term	311.471***	303.015***
	(9.814)	(7.874)
High Caste	5.194**	6.869**
	(2.434)	(2.581)
Male	17.879***	20.685***
	(2.407)	(1.745)
Nepali spoken at home	-3.535	-4.523
	(2.137)	(3.076)
Joint family structure	-5.077***	-1.782
	(1.764)	(1.888)
Wealth Index	-2.216**	0.443
	(1.000)	(0.676)

Cash Income Level 1	0.000	2.026
	(.)	(3.410)
Cash Income Level 2	0.000	-3.985*
	(.)	(2.323)
Cash Income Level 3	0.000	0.791
	(.)	(2.760)
Cash Income Level 4	0.000	-6.348***
	(.)	(2.209)
Cash Income Level 5	0.000	-5.273***
	(.)	(1.848)
Cash Income Level 6	0.000	0.000
	(.)	(.)
Cash Income Level 7	-4.754	0.000
	(4.328)	(.)
Cash Income Level 8	-0.386	0.000
	(4.240)	(.)
Cash Income Level 9	2.779	0.000
	(4.806)	(.)
Cash Income Level 10	0.000	0.000
	(.)	(.)
Cash Income Level 11	0.000	0.000
	(.)	(.)
Literate Father	12.024***	7.813***
	(2.684)	(2.055)
Literate Mother	11.551***	4.687***
	(2.415)	(1.719)
Time taken to reach school	-0.088	-0.109***
	(0.055)	(0.028)
Parents guide in studies	8.019***	5.318**

	(2.314)	(2.041)
Parents talk to school at least 12 times a year	0.230 (1.742)	2.799 (1.901)
Parents want children to do a Master's	29.645*** (3.759)	20.995*** (2.799)
School located in district hq.	6.774 (8.346)	22.680*** (3.145)
School is private	113.403*** (7.152)	82.112*** (5.975)
School has *pucca* building	6.928 (6.721)	7.767 (5.181)
School has well-built roof	0.131 (4.229)	0.936 (3.917)
Time spent on household chores	-2.822*** (0.656)	-3.036*** (0.749)
N	9452	8219
R squared	0.383	0.435
Standard errors in parentheses		
* p<0.1	** p<0.05	*** p<0.01